

## Accelerator Systems Division Highlights Ending September 16, 2005

### Installation

Craft Snapshot 9/13/05

ASD productive craft workers	45.0
Foremen (Pd by 15% OH)	6.0
HSM management (Pd directly)	3.0
TOTAL AMSI WORKERS	54.0
Less WBS 1.9, 1.2 etc	7.0
Less absent	1.0
TOTAL PD BY ASD/ORNL DB WPs	37.0

### Accelerator Physics

- SCL beam commissioning terminated 9/19/05. In the last week, long beam pulses were accelerated to full energy in the linac. We reached 15 mA average current, 900 microseconds at 0.2 Hz accelerated to 900 MeV. Losses were found to not scale linearly with intensity, indicating that some of the losses are due to improper acceleration during the beam/RF turn on transient.
- Full sets of transverse beam profile measurements were obtained in the normal and super-conducting linacs. Preliminary analysis shows good agreement with predicted values. Sets of data for mismatched beams were also obtained.

### Operations

- Plan to continue the commissioning Run to Sep 19
- Operated with Escorted access to the Klystron Gallery Warm Section during beam operations
- Operated with RCT access under a RWP to the Klystron Gallery Cold Section during beam operations
- Beam Fault Studies were completed Monday
- The Chopper was run for 2 days
- Operated the Laser Wire Scanner and took Optics data
- We completed Long Pulse running
- We completed a reconfiguration of Control Room workstations with a focus on Alarms and an Alarm Workstation
- Continued working with PSSO on TW/CW stability, PID coefficients for Fans
- Beginning to look at RID integrated testing procedure
- Sent out a request to the ASD Maintenance Coordinators to identify critical PM items for systems.
- Preliminary meeting with Radiation Calculations group.
- This week, gather calculations that have been done and look at extending them to additional areas.

### Ion Source

- The ion source on the Frontend continued to deliver the required beam after 65 days of operation. No assistance was needed from Martin or Rob, who were available by the means of an international cell phone.
- The three presentations given at the 11th International Conference on Ion Sources were received with high interest. SNS was the only institution, from which every participant was asked to present his findings orally.

### Survey and Alignment

HEBT/RING:

- Set upstream end of RID flight tube.
- Set the RID flange (direct welders).
- Map final location of RID flange.
- Half Cell final alignment: RA1-2 & RA2-2.
- Set the stripper foil and verify the camera's line of sight to the beam window.
- Prepared ideal data for the positioning of the Ring Extraction Kickers

RTBT:

- Rad-Hard stand rails aligned.
- Rad-Hard stand rails mapped.
- Set the 30Q Extraction Dump stands for elevation.
- 21Q40 final alignment QH22 & QV23.
- Prepared ideal data for the alignment of the RTBT Dipole Magnet.
- By COB Friday, all installed 21Q40 assemblies (through QH24) have been aligned.

**TARGET:**

- Elevation marks set out on BL2 PIP for BL3 cave.
- Initial Target floor elevation monitoring completed.
- Verify the linearity of the hut network in preparation for BL4 shutter work.
- Map BL2 chopper NCS012-1 attributes (fiducials, aperture, and circular superstructure).
- Verify all horizontal and vertical dimensions of ball and flat mounts on BL13 CVI.
- Set the shutter tray for BL13 shutter insert.
- Mercury pump seal survey (S&A lab area).

**Mechanical****RTBT/Target interface work**

- Grouted rail support plates.
- Installed rail supports in target interface
- Started installing rails.
- Completed the fabrication of the water cabinet for the buss and quads.
- Set up filter for the flushing of the 7 quads in the beginning of the RTBT for power supply testing.

**Ring work:**

- Finished the installation of the air lines for the RTBT/Injection gamma blockers.
- Hooked up the water cooled buss for the extraction septum.
- Did the test for the crimped on fittings for the large hose on the half cells.
- Continued the installation of the oil lines on the PFN tanks.

**Water Systems Installation**

- Obtained ultrasonic flow readings for the DI loop to the heat exchanger on RCCS DTL-5. Determined that the EPICS flow read-out corresponds to the ultrasonic flowmeter – therefore, the readings are accurate for this loop at least. The RCCS systems are tuned and under Operation's jurisdiction thus preventing further verification until the shut-down on Monday, September 19th.
- Installed a rotameter on the RF Power Supplies for Tom Hardek in the Ring Service Building (RSB). The rotameter will assure that the loop is obtaining adequate flow since the manufacturer installed flow-switches are unreliable.
- Obtained ultrasonic flow readings for the Ring half-cell magnets
- Work has continued on RTBT to Target piping, ~75% complete.
- Work has started on piping and hoses for the PFN oil circuits, ~40% complete.
- Compressed air lines for RID Gamma blocker completed until equipment is installed.
- Connected the Lambertson bus bar cooling from the RSB to tunnel.
- Test completed on 1-1/2" crimp end fitting. Passed at 200 and 320 psig while cycling.
- Flushing of RTBT Mag-DIW header started to accommodate electrical test next week.
- Flow distribution testing of Ring Half Cells is continuing.
- Working on flow distribution options for next week's decision.
- Started coming up to speed on Targets loop systems and testing plans.

**Magnets**

- This week we put together another 30Q58 assembly and performed test measurements on the RTBT Dipole search coil.

**Electrical**

- Power Supplies: All 7 HEBT magnet power supplies in the Ring Service Building have been operated and commissioned along with their associated magnets. This includes integration with the EPICS control system and calibrations. All but power supply QV25t31o were tested to at least 12% above the current setting necessary for 1.0 GeV operation. Power supply QV25t31o was only fully tested to the 1.0 GeV operational point – water cooling problems with the magnets precluded higher current operation. These cooling problems did not preclude all of the other tests, including operation and calibration of the power supply to 20% above the 1.0 GeV operational point for short (~30 minutes) period of time. This completes the testing of 15 of 54 Ring Service Building Magnet Power Supplies. Testing of the 7 RTBT power supplies in the Ring service building will start next week.
- Installation of all cables in the PFN room required for the extraction kickers are complete. Terminations will begin next week.
- Terminations of all BPM cables in the Ring and RTBT from the Ring to the ground break are complete. HEBT terminations for the ground break to the ring will be completed next week now that HEBT power supply/magnet testing has ended.
- Conduit runs for the ring BLMs are complete. Cable installation will begin next week.

## **RF**

### **Linac HPRF**

- Provided operational support for beam studies. Minor faults that occurred with klystron vacuum and magnet power supplies were addressed.
- A 402 MHz E2V klystron lift procedure and JHA were written to support klystron manipulation in the RFTF.
- Klystron testing in the RFTF was postponed so the RF techs could support Ring RF installation and help the Diagnostics group.

### **Ring RF**

- Generated the first RF power in the SNS Accumulator Ring on Monday, Sept. 12, 2005. Produced 2 kV peak of 1 .04 MHz gap voltage on cavity RF21. Cavity 21 was configured as a 1st harmonic cavity for this test.
- Verified that there is no measurable RF leakage around the amplifier or cavity.
- Operated Cavity RF21 at full design level of 7 kV per gap.
- Successfully operated the RF21 station from EPICS screens and identified some control issues to work on.
- Will keep Station RF21 operational to investigate possible interference problems with Ring Diagnostic equipment.
- Installation of the remaining stations is proceeding. LLRF

## **Cryo Systems**

- Stable 2K operation for almost 3 weeks
- Had 3 turbine trips due to water flow this week, able to restart them without tripping 2K Cold Box
- CM23 is ready to be installed in the LINAC, passed successfully complete leak checks of all circuits and insulating vacuum

## **Beam Diagnostics**

### **BPM**

#### **Wire Scanners:**

### **BLMs**

#### **Video Imaging Systems**

- Installed optical table and set up both Foil Video systems in DAS lab; obtained EDM video widget from Diamond Lab in UK.
- Hosted Dave Gassner (BNL) who assisted with Video Foil system integration and Target viewscreen acquisition system design.
- Callie Goetz presented well received overview of Target ViewScreen acquisition system to visitors including Governor Bredesen, and UT President Peterson.
- Met with head of DOE BES division; completed committee report covering review of Diagnostics for the GSI FAIR project.

### **BCM:**

- Setting up of development systems for Ring/RTBT systems
- Laser: profiles have been taken while varying quadrupoles
- Display systems: brackets have been mounted and wiring is being installed (perhaps ready by tomorrow for open house)

## **Controls**

- The LEBT choppers were again repaired, and then the chopper pattern was reprogrammed to blank off the first 100 usec of beam. Earlier in the SCL commissioning a single turn injection pulse for ring commissioning had been produced.
- The long ion chamber (LION) was used to take loss data at ~470 and ~700 MeV. The loss pattern was spread out over many cryo modules – concentrated near cavities 19c and 19d. The response is seen in the charts below.
- Installation of the ring vacuum system is going well. The Ring IOC, PLC1, PLC3, and PLC 4 are installed. Also the wiring kits associated with each PLC is installed in the racks. The Hytec RS-485 termination kits are installed in the racks. None of these systems are powered up, waiting on AC power some time next week. Tunnel cable pulls will also start next week. Ring and RTBT PLC (PLC1-4) logic have been revised, and a Beckhoff test environment established.
- Progress is being made on MPS software for the Ring and RTBT. At the same time, more operator-friendly and intuitive MPS screens are under development.
- The Target building IOC is ready for testing. Target utilities control software (EPICS and PLC) is now being downloaded from the Sverdrup Tullahoma (SvT) file server at least weekly and added to the operating systems being used for testing and checkout of light water cooling loops 1 and 2. More PVs were added to archive request files to support operational tests on light water cooling loops 1 and 2.
- Instrument calibration continues for Target light water cooling loops 1 and 2. Operational testing of loop 2 occupied most of this week and testing of loop 1 will start next week.